From: Levy, Aaron
Importance: Normal
Subject: Permeate comments were due 3/14/14
Start Date/Time: Mon 3/17/2014 1:00:00 PM
End Date/Time: Mon 3/17/2014 1:30:00 PM

Company: Permeate Refining
File As: Smith, Darrell
E-mail: corpgold@netconx.net
Display As (E-mail): Darrell D. Smith
Business Telephone Number: (641) 421-7489
First: Darrell
Family: Smith

To: Levy, Aaron[Levy.Aaron@epa.gov]
From: Blackburn, Julia via RT
Sent: Wed 4/16/2014 1:46:02 PM
Subject: [EMTS Support #48315] DSmith (Permiate Refining): Petition for D-5 RINs

Wed Apr 16 09:46:01 2014: Request 48315 was acted upon.
Transaction: Correspondence added by JBlackburn
Queue: TCD Program Support
Subject: DSmith (Permiate Refining): Petition for D-5 RINs
Owner: ALevy
Requestors: Nealer.Rachael@epamail.epa.gov, corpgold@netconx.net, heard.geanetta@epamail.epa.gov
Status: open
Ticket <URL: https://emtsrtprod.rtpnc.epa.gov/Ticket/Display.html?id=48315 >

Darrell,

Please find below Aaron Levy's response to your latest email.

Dear Mr. Smith,

I?m sorry you didn?t receive the email I sent last Friday (4/11). I will resend that email shortly.

Thank you for email asking about the eligibility of ethanol produced from the non-cellulosic portions of separated food waste (row P in Table 1 to 40 CFR 80.1426). I am referring your questions to the appropriate staff in our Compliance Division, using the ticket number in the subject line of this email (#48315).

Sincerely,

Aaron Levy
Transportation and Climate Division (TCD)
Office of Transportation and Air Quality (OTAQ)
U.S. Environmental Protection Agency (EPA)
levy.aaron@epa.gov, 734-214-4586

On Wed Apr 16 09:40:45 2014, JBlackburn wrote:
> History of Emails between Aaron Levy and Darrell Smith
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> Sent: Tuesday, April 15, 2014 7:59 PM
> To: Levy, Aaron
> Subject: RE: [EMTS Support #48315] Permeate Petition Status
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> To: Darrell D. Smith
> Subject: RE: [EMTS Support #48315] Permeate Petition Status
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> levy.aaron@epa.gov, 734-214-4586
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> From:Levy, Aaron
> Sent: Monday, March 10, 2014 2:54 PM
> To: Darrell D. Smith
> Cc: 'Dennis Roland'
> Subject: RE: [EMTS Support #48315] Permeate Petition Status
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> Subject: RE: [EMTS Support #48315] Permeate Petition Status
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> 515-422-3403
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> Sent: Tuesday, February 18, 2014 10:25 AM
> To: Darrell D. Smith
> Subject: RE: [EMTS Support #48315] Permeate Petition Status
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> Sent: Friday, February 14, 2014 6:47 PM
> To: Levy, Aaron
> Subject: RE: [EMTS Support #48315] Permeate Petition Status

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> To: corpgold@netconx.net
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From: Blackburn, Julia via RT
Sent: Wed 4/16/2014 1:40:46 PM
Subject: [EMTS Support #48315] DSmith (Permiate Refining): Petition for D-5 RINs

Subject: [Comment] DSmith (Permiate Refining): Petition for D-5 RINs https://emtsrtprod.rtpnc.epa.gov/Ticket/Display.html?id=48315 This is a comment. It is not sent to the Requestor(s): **History of Emails between Aaron Levy and Darrell Smith**

From: Darrell D. Smith [mailto:corpgold@netconx.net]
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Aaron Levy

Transportation and Climate Division (TCD)

Office of Transportation and Air Quality (OTAQ)

U.S. Environmental Protection Agency (EPA)

levy.aaron@epa.gov, 734-214-4586

From: Levy, Aaron
Sent: Monday, March 10, 2014 2:54 PM
To: Darrell D. Smith
Cc: 'Dennis Roland'
Subject: RE: [EMTS Support #48315] Permeate Petition Status

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515-422-3403

From: Levy, Aaron [mailto:Levy.Aaron@epa.gov]
Sent: Tuesday, February 18, 2014 10:25 AM
To: Darrell D. Smith
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levy.aaron@epa.gov, 734-214-4586

To: Levy, Aaron[Levy.Aaron@epa.gov]
From: Darrell D. Smith
Sent: Fri 4/11/2014 1:30:30 PM
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Mr. Levy

I have had zero time working 20 hour days trying to get certain things done for a transition

I will call you today; we have not submitted a full petition update – I submitted s summary but will get with the scientist who wrote most of that and give you a call

I understand this is an important issue for us. I am sorry for not calling earlier – I just have had no time – I will call you next week.

Darrell

515-422-3403

From: Levy, Aaron [mailto:Levy.Aaron@epa.gov]
Sent: Tuesday, April 08, 2014 1:20 PM
To: Darrell D. Smith
Subject: RE: [EMTS Support #48315] Permeate Petition Status

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levy.aaron@epa.gov, 734-214-4586

To: Levy, Aaron[Levy.Aaron@epa.gov]
From: Blackburn, Julia via RT
Sent: Fri 12/6/2013 1:24:16 PM
Subject: [EMTS Support #48315] AutoReply: DSmith (Permiate Refining): Petition for D-5 RINs

The following ticket has been transferred to your ownership:

[EMTS Support #48315] "DSmith (Permiate Refining): Petition for D-5 RINs"

RT-Attach-Message: yes

Fri Dec 06 08:24:16 2013: Request 48315 was acted upon.
Transaction: Given to ALevy by JBlackburn
Queue: TCD Program Support
Subject: DSmith (Permiate Refining): Petition for D-5 RINs
Owner: ALevy
Requestors: Nealer.Rachael@epamail.epa.gov, corpgold@netconx.net, heard.geanetta@epamail.epa.gov
Status: open
Ticket <URL: https://emtsrtprod.rtpnc.epa.gov/Ticket/Display.html?id=48315 >

This transaction appears to have no content

To: Levy, Aaron[Levy.Aaron@epa.gov]
Cc: 'Dennis Roland'[droland50@ymail.com]
From: Darrell D. Smith
Sent: Mon 3/10/2014 3:49:15 PM
Subject: RE: [EMTS Support #48315] Permeate Petition Status
Advanced Biofuel Report Greenhouse Gas w Cellulose.docx

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SUMMARY ANALYSIS OF GHG EMISSIONS OUTPUT
IN THREE MODELS
OF CELLULOSE FUEL PRODUCTION

OCTOBER 12, 2011

JERRY HATFIELD, PHD, DIRECTOR NATIONAL LAB USDA

DARRELL SMITH, ANALYST PERMEATE REFINING

ABSTRACT

This paper seeks to compare three distinct cellulose feedstock conversion models against increased efficiency toward eliminating Greenhouse Gas (GHG) emissions. The three models that will be examined are:

1. **Permeate Refining**, **LLC** Hopkinton, Iowa, a 5 MGPY sugar and cellulose waste ethanol and 10 MWH cellulose biogas production plant, having been in operation since 1991 and 1998 respectively;
2. **Fiberight, Inc**., Blairstown, Iowa, a 5 MGPY Municipal Solid Waste cellulose & anaerobic digestion plant currently under construction;
3. **DuPont**, Nevada, Iowa, a proposed 20 MGPY corn stover ethanol plant currently under construction.

This paper seeks to correct misperception regarding Permeate Refining and the energy requirements needed to process one gallon of ethanol into fuel relative to other cellulosic processing companies. This paper is geared toward proving that Permeate Refiining's feedstock processing techniques and Btu output are equivalent, and in some cases, an improvement over other cellulosic dependent models resulting in a reduction in GHG emissions.

The authors believe that the Renewable Fuels Standard (RFS2) is a GHG emissions based legislation which sought to

1. Identify waste sources which contributed to the production of GHG emissions; promoting feedstock which lessen GHG emissions;
2. Apply a burden of payment system against feedstock which increased GHG emissions;
3. Define those feedstock sources which were GHG emissions intensive. It chose cellulose and food waste as feedstock based on scientific studies written for the purpose of guaranteeing energy sustainability while ensuring an overall decrease in GHG emissions.

The following biases are the basis of this report:

1. An efficient fuel-to-cellulose model should seek to decrease the output of greenhouse gas (GHG emissions) emissions;
2. An "optimum" input of cellulose should be sought versus a "maximum" input of cellulose for a specific energy model, in order to achieve maximum sustainability and profitability while lowering overall GHG emissions output;
3. Placement of cellulose on the processing front or back-end should be

reviewed in order to achieve maximum sustainability and profitability while lowering overall GHG emissions outputs;

4. A true GHG emissions intensive cellulose model will seek to marry varying feedstock additives in order to achieve maximum sustainability and profitability while lowering GHG emissions outputs;
5. An overall reduction in GHG emissions can be shown to be synonymous with an increase in energy efficiency of the model relative to achieving maximum sustainability and profitability;
6. A combination of feedstock mix, with cellulose, should be considered in order to achieve a truly optimal GHG emissions intensive reduction model, versus "cellulose" for the sake of "cellulose";
7. The notion that a "true" cellulosic model includes a majority of processed cellulose on front-end, is inconsistent with the need to achieve an optimal decrease in GHG emissions. A truly optimal GHG emissions policy should include cellulose within the model regardless of its point of entry into the fuel processing platform.

Each of the three production models will be examined for specific

1. Cellulose content;
2. Energy modeling of inputs and outputs;
3. Byproduct and subsequent energy consequences of the byproducts within each model;
4. Sustainability; and
5. Profitability.

Greenhouse Gas emissions consist of three main gas emitting sources:

1. CO2
2. Methane
3. NOx and other

This paper will not concentrate on any particular associated gas. This paper assumes that the greater the beneficial Btu output of a particular feedstock, relative to the overall energy cost required for the feedstock to be processed into fuel, the lower the overall effect that feedstock will have on generating unwanted GHG emissions, regardless of the specific gas in question.

For example, waste sugars, when processed into ethanol require up to 18 pounds of waste feedstock on a solid basis. Most waste sugars are land applied, thereby denying any positive fuel production benefit from these 18 pounds. When land applied, the waste sugars are, themselves, "wasted". The amount of energy required to replace these sugars in order to produce one gallon of ethanol, or fuel, is significant being subject to energy requirements for growing, tilling, harvesting, and processing an equivalent 20 pounds of corn to replace the lost fuel gallon. The energy requirement equates to 68,556 Btus. That is, each time 18 pounds of sugar waste is land applied, 68,556 Btus are required to replace the wasted sugars. In addition, once land applied, the waste sugars combine with natural bacteria in the soil and emit 123,299 equivalent methane based Btus which must now be ameliorated or accounted for from a GHG emissions perspective. Thus, on average, each 18 pounds of waste sugars will emit up to 95,927 Btus ((68,556+123,299)/2) per equivalent gallon of, what could have been, one gallon of ethanol.

From a Permeate Refining processing model, each time 18 pounds of sugar that is wasted, requires a replacement of 68,556 Btus to grow harvest and processing 20 pounds of corn into ethanol. Additionally, when the sugar is sent to the landfill it emits 123,299 in negative GHG measurable methane emissions. When taken together, and not averaged, each wasted 18 pounds of sugar requires 191,855 Btus to replace what could have gone into one gallon of fuel.

The same would be true of wasted fuel convertibles contained within MSW – the Fiberight model.

The DuPont model is a cellulose intensive model based on taking corn stover and converting that into a fuel versus allowing the corn stover to enrich and/or pollute the soil.

This paper will review the negative GHG emissions effects of each primary feedstock at each cellulose based processing plant.

CELLULOSE CONTENT AND PLACEMENT

No GHG emissions model can claim to have 100% cellulosic conversion and relative associated 100% energy conversion from this content. Everything works in percentages and averages. It is the purpose of this paper to show that a true GHG emissions model should be based on the optimum content and processing placement of cellulose in a fuel processing model in order to achieve maximum decrease in GHG emissions.

The placement of cellulose into a cellulose intensive energy model occurs primarily at two stages within the model:

1. **Front-end**: Where cellulosic feedstock is introduced for conversion to fuel;

2. **Back-end**: Where stillage derived from the front-end processing, having been dried, is converted into a synthetic gas to produce electricity to provide electrical energy to help operate the processing plant. Back-end processing introduction of cellulose can be both stillage and additive based.

The following cellulosic chart helps explain the differences between the three models as to cellulosic introduction into the model.

Company Name	Cellulose Percent Front-End Processing	Cellulose Percent Back-End Processing	Combined Average Percent Cellulose
Permeate Refining	14%	90%	52.000%
Fiberight	44%	70%	57.000%
DuPont	65%	70%	67.500%

Figure 1.1 Cellulosic Percent

The introduction of cellulose into the three models differs from one plant to the other:

1. **Permeate Refining**: Permeate Refining has a lower percentage of cellulose on the front-end, but higher on the back-end. Most of the cellulose that is introduced at the back-end is additive. Permeate Refining uses stillage from the front-end as a "glue" to hold together additive cellulose that is compressed in a "cuber" and prepared for introduction to the biogas unit on the back-end. Permeate introduces nearly pure cellulose on the back-end, being selective in its selection of cellulose for optimum conversion to electricity;
2. **Fiberight**: The cellulosic content of Fiberight's front-end feedstock comes mainly from Municipal Solid Waste (MSW), but, once separated, the remaining cellulose for conversion into biogas increases. Fiberight, Inc. proposed to separate the MSW into two major classes, feedstock convertible to ethanol and anaerobic digestion, and feedstock prepared for chemical extraction and then land filled.
3. **DuPont**: DuPont's corn stover model consists of drying the stillage from the stover on the front-end, once the water is stripped (after conversion to ethanol) the remaining cellulosic mass for conversion to biogas to produce electricity increases.

From a processing platform, DuPont's model is the most cellulosic intensive .

However, this paper seeks to determine which model leads to an increased reduction in GHG emissions subject to

1. Amount of cellulose present in the model and
2. Placement of cellulose in the model.

BTUS IN FEEDSTOCK RECEIPT & PROCESSING

The following Btu production charts outline the GHG emissions differences between Permeate Refining, Fiberight and DuPont. These charts compare the negative effects of "doing nothing" (land applying waste for example) versus converting the feedstock into fuel.

The sugar waste and MSW industries typically have three choices when deciding where to send waste:

1. Land application;
2. Cattle feed;
3. Fuel production.

Nearly all MSW and waste sugars are land applied due to convenience. Dr. Timothy Jones estimated that over ninety percent (90%) of the food wasted in this country ends up in a landfill[1].

Each company's process and its associated feedstock based GHG emissions will be discussed. The following charts will lay the foundation in answering the question as to which model leads to a overall decrease in GHG emissions.

---

1 http://www.ce.cmu.edu/~gdrg/readings/2006/12/19/Jones_UsingContemporaryArchaeologyAndAppliedAnthropologyToUnderstandFoodLossInAmericanFoodSystem.pdf

Methane and Avoidance						
Assumptions						
Gallons of Ethanol Per Dry Ton of Food Waste	111	Annual Cubic Feet Methane Derived per Ton of Permeate Waste	12,005	Btus per Cubic Foot of Permeate Waste Measured as Methane Output	13,686,156	
Gallons of Ethanol per Dry Ton of Corn Stover	80	Annual Cubic Feet Methane Derived per Ton of MSW Waste	1,412	Btus per Cubic Foot of Fiberight Waste Measured as Methane Output	1,610,136	
Gallons of Ethanol per Dry ton of MSW	57	Annual Cubic Feet Methane Derived per Ton of Corn Stover as Percent of Non-Utilization	3,531	Btus per Cubic Foot of DuPont Stover Measured as Methane Output	4,025,340	
Production Model	**Feedstock for Ethanol**	**Average Dry Pounds of Feedstock for Converstion to One Gallon of Ethanol**	**Percent of Cellulose Present in First Stage of Fuel Production**	**Hatfield Avoided Energy Cost as a Btu per Gallon**	**Methane Generated Avoided Energy Cost as a Btu Per Gallon**	***Total Btus Per Gallon of Ethanol***
Permeate Refining	**Food, Starch and Cellulose Waste**	18.02	12%	68,556	123,299	***95,927***
Fiberight	**Food, Starch, Cellulose, and MSW waste**	30.00	44%	49,410	20,127	***34,768***
DuPont	**Corn Stover and Corn residual**	24.00	65%	35,204	70,620	***52,912***

1.2 Methane Chart

Research has shown that methane produced from waste sugars is among the most pervasive food waste based GHG emitters and pollutants in the United States[2]. The EPA estimates that methane production is 21 times more potent as a GHG emitter as is carbon dioxide[3] and can be as high as 50 times more potent over time if not

[2] RESEARCHES ON USING SUGAR BEET FOR PRODUCING BIO-FUELS (BIO-ETHANOL AND BIO- GAS), Research Journal of Agricultural Science, 42, 2010

[3] http://www.wbez.org/blogs/chris-bentley/2013-05/more-methane-epa-reexamines-potency-greenhouse-

adequately addressed from a landfill management perspective. [4]

Methane contained within a biomass solid is released at varying rates. Methane release from waste sugars is among the quickest release patterns. Because methane degrades much faster than CO2, the quicker the release rate of methane, the greater and more potent the negative affect it will have on GHG emissions. A faster release rate will place more methane in the atmosphere quicker than a slow release rate. Nature tends to absorb methane which is released at slower rates. Cellulose, such as corn stover, although high in methane accretive compounds, releases methane to the atmosphere at half the rate of waste sugars.

Although the EPA estimates that food and human waste represents the third largest overall[5] methane emitter, behind petroleum and livestock, waste sugars, pound for pound, is among the strongest contributors to GHG emissions than all substances overall based on their rate of release. [6] Dr. Timothy Jones estimates that food waste is a larger contributor to GHG emissions than previously thought and could be the top contributor.[7] Whatever its contribution rate, waste sugars contribution to methane production is high. One reason waste sugars are more dangerous methane emitters than petroleum, natural gas, or livestock is that methane production from waste sugars acts as a ticking "time bomb" quickly releasing it emissions over a two year period compared to other cellulosic emitters which can release their methane for up to ten years before reaching its half life. Once sugar is land applied, the process of methane production is nearly impossible to reverse.

One pound of sugar wasted in a landfill can produce up to 13,698 Btus of equivalent methane equivalent output over a two year period before the half-life of the methane production process begins to sufficiently, and quickly degrade.[8] MSW, on the other hand, demonstrates a slower release than waste sugars, with a half-life exceeding five years on average given the slower release of cellulose based mass, such as paper and sludge. MSW's methane release averages 11% of the methane release from waste sugars. Methane production from land applied stover has a half life of three to five years, having a release rate of 40% of that of equivalent waste sugars. However, land applied stover can be positively viewed relative to the

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gas-107148

[4] ibid

[5] http://epa.gov/climatechange/GHG emissionsemissions/gases/ch4.html

[6] http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-8544/BAE-1762web.pdf

[7] http://www.ce.cmu.edu/~gdrg/readings/2006/12/19/Jones_UsingContemporaryArchaeologyAndAppliedAnthropologyToUnderstandFoodLossInAmericanFoodSystem.pdf

[8] http://www.wtert.gr/attachments/article/211/Karagiannidis_HelLandfillGas.pdf and http://www.nrel.gov/docs/legosti/fy97/26041.pdf

nitrogen present in the stover[9] which acts as a soil enrichment for planting purposes. When stover is not land applied, farmers must replace the lost nitrogen with additional manure. The added manure acts as a higher, and quicker, emitter of methane than does the stover.

The 1.2 Methane Chart above illustrates that sugar is a highly degradable waste which easily combines with natural bacteria in the land creating effective methane production. The chart shows the following:

1. **Permeate Refining** – waste sugars and partial cellulose has an equivalent release rate of 95,927 Btus equivalent methane;
2. **Fiberight** – MSW has an equivalent release rate of 34,768 Btus equivalent methane;
3. **DuPont** – corn stover has an equivalent release rate of 52,912 Btus over

In other words, if waste sugars are taken to the land fill versus processed into ethanol, the equivalent methane release equates to 95,927 Btus of equivalent GHG emissions. This methane measurement does not include measurable CO2 output from the same process which is equally measured and pervasive.

Permeate Refining combines the production elements of food waste and cellulose to achieve a fuel model which optimizes a reduction in GHG emissions and improves profitability.

Land application of waste sugars is much more dangerous to the environment than land application of cellulose based MSW containing food waste and/or corn stover which offers more positive land application benefits than negative. Waste sugars, on the other hand, destroys vegetation and creates an negative ecosystem which is difficult, if not impossible, to reverse.

[9] http://sungrant.tennessee.edu/NR/rdonlyres/5781889E-695B-4B95-8185-84096468CF51/3735/Jin_Virginia.pdf

The following chart was used in determining the Btu processing costs of each plant's physical energy processing requirements.

BTUs per Gallon of Ethanol for Processing

	Fixed Plant Btus - Electrical, Lights, Per Gallon	Feedstock Prep Per Gallon	Cooking & Fermentation Per Gallon	Distillation Per Gallon	Evaporation & Decanter Per Gallon	Stillage Handling Per Gallon	Water & Transportation Reuse BTUs per Gallon	Pre-Prep Conversion Additive (1) BTUs per Gallon	Ferm Enzyme BTUs per Gallons Per Gallon	Total BTUs Processing
Permeate Refining	2,048	-	1,973	7,540	5,120	2,005	54	1,995	1,479	**22,213**
Fiberight	3,780	4,100	3,895	7,540	7,974	2,005	833	4,181	3,067	**37,375**
DuPont	3,780	4,100	3,895	7,540	7,974	2,005	531	9,957	1,670	**41,452**

Figure 1.3 Processing Requirements

From Figure 1.3 above, Permeate Refining shows a Btu Processing requirement of 22,213 Btus, nearly half that of Fiberight and DuPont. The reason for the processing reduction is due to the following variables:

1. **Fixed Plant Btus**: Permeate Refining is a small plant and, as such, utilizes less electricity per square foot requiring fewer accommodative lighting requirements as larger plants that are more spread out such as Fiberight and DuPont;
2. **Pre-Processing**: Waste sugars arrive at Permeate's plant "pre-processed" and require lower energy costs in pre-treatment. Most waste that arrives at Permeate Refining moves directly into the fermentation systems for conversion to fuel. Corn stover requires extensive energy and chemical treatment prior to entering the fermentation process as does MSW. This lack of front-end processing results in a decrease, on average, of 4,100 Btus per gallon.
3. **Fermentation**: Permeate Refining's waste sugar fermentation requires a decrease in processing Btus due to decreased chilling and enzyme requirements. Permeate Refining owns two subterranean Geothermal processing wells which cools the fermentation process naturally cutting the Btu cost per gallon by up to half. The decrease in chemical additives, as compared to Fiberight and DuPont, results in a decrease of up to 3,000 Btus per gallon;
4. **Water**: Much of the feedstock arriving at Permeate comes replete with high concentrations of water. Additionally, Permeate Refining the two geothermal cooling wells which provide a constant source of underground water decreasing the need for water input from an outside source as is the case at Fiberight and DuPont.

Overall, Permeate Refining's energy requirements for processing one gallon of ethanol are decreased by up to 15,300 Btus per gallon of ethanol.

TRANSPORTATION

The following chart was used in determining the Btus expended during the transport of feedstock to the plants.

Btus Per Gallon of Ethanol Relative to			Number of Miles Driven								
			20	40	60	80	100	120	140	160	180
Percentage Moisture Present in a Feedstock	Btus Saved Per Pound of Convertible Feedstock	Gallons of Animal Feed Solids Load									
10%	34		139	278	417	556	695	834	973	1,112	1,251
20%	68	2,071	156	313	469	626	782	938	1,095	1,251	1,408
30%	103	1,812	179	357	536	715	894	1,072	1,251	1,430	1,609
40%	137	1,553	209	417	626	834	1,043	1,251	1,460	1,668	1,877
50%	171	1,294	250	500	751	1,001	1,251	1,501	1,752	2,002	2,252
60%	205	1,035	313	626	938	1,251	1,564	1,877	2,189	2,502	2,815
70%	239	776	417	834	1,251	1,668	2,085	2,502	2,919	3,336	3,753
80%	274	518	626	1,251	1,877	2,502	3,128	3,753	4,379	5,005	5,630
90%	308	259	1,251	2,502	3,753	5,005	6,256	7,507	8,758	10,009	11,260
Assumptions											
Pounds of Solids for One Gallon of			15								
Miles per Gallon of Truck Hauling			7								
Btus Per gallon of Diesel			128,450								
Pounds of Product Per Longhaul Truck			44,000								

Figure 1.4 Transportation Btu Requirements Relative to Moisture

Permeate Refining receives its waste from a rail site in Cedar Rapids and transports that waste to the plant. The distance of that haul is approximately 40 miles. Additionally, the average water content of the feedstock which Permeate receives is less than 10%. Moving across the top and then to the moisture content of 10% or less you arrive at a variable of 278 Btus per gallon for Permeate Refining.

Fiberight, on the other hand, receives MSW, over one-half of which is food waste in its purest, water saturated form. Food waste is 70% water, and MSW, typically runs in the 50% water category overall. Thus, the water content average of 60% and the haul distance of 40 miles of the MSW to the plant requires, on average, up to 626 Btus per gallon.

DuPont hauls its corn stover up to 40 miles away, but has internal requirements to stay within a 30 mile radius. Nonetheless, corn stover consists of 50% water and most of the stover arriving at the plant has not been pre-dried or pre-treated. Thus, the Btus on a transportation basis, would be 500 Btus per gallon.

Permeate Refining shows no Btu requirements for planting, tilling, harvesting or drying its feedstock as the energy spent in creating waste sugars are already used up in the processing of the derivative feedstock. Like corn stover, the EPA does not assign any Btus for planting, tilling, harvesting or drying as the energy for stover is used up in the processing of corn into food and fuel.

The effect of transporting the feedstock to the plants is noted in the Drying, Transporting and Processing chart shown below.

OVERALL BTU REQUIREMENTS INCLUDING TRANSPORT & DRYING

Processing, Transporting and Drying Costs Combined						
Assumptions						
Permeate Capacity MGPY[1]	4,000,000	Permeate Pounds of Water After Centrifuge	162			
Fiberight Capacity MGPY	5,000,000	Fiberight Pounds of Water After Centrifuge	270			
DuPont Capacity MGPY	20,000,000	Dupont Pounds of Water After Centrifuge	216			
	Feedstock	**Btus Expended per Gallon for Conversion to Ethanol**	**Btus Expended Per Gallon for Transportation of Feedstock**	**Btus Per Gallon of Ethanol for Growing, Harvesting, Pre-Processing**	**Added Btus per Gallon of Ethanol for Second Step in Water Reduction as a Btu**	***Total Consumption Btus Per Gallon***
Permeate Refining	**Food, Starch and Cellulose Waste**	(22,540)	(278)	0	0	***(22,818)***
Fiberight	**Food, Starch, Cellulose, and MSW waste**	(37,785)	(626)	(2,097)	(2,410)	***(40,508)***
DuPont	**Corn Stover and Corn residual**	(41,452)	(500)	0	(2,243)	***(41,952)***

1 Permeate Refining's Btus per Gallon, Growing, Harvest, and Pre-Processing show a value of "0" based on the same premise the EPA applies to corn stover; that is, all the energy for pre-processing corn stover is taken up in the derivative feedstock itself, as stover is not grown for the sake of "stover". Waste sugars are neither produced for the sake of waste sugars but are rather an incidental effect of processing derivative crops into food products.

Figure 1.5 Processing, Transportation, and Drying Btu Additive Chart

As shown in Figure 1.5 Processing, Transportation and Drying Btu Additive Chart above, each company has a distinct cost associated with drying its feedstock as shown above.

1. **Waste Sugars with part Cellulose**: Permeate Refining does not require that their stillage be dried, but rather "de-watered". This dewatering process requires less energy per gallon of ethanol processed. Permeate receives cellulosic biomass at this biomass plant. The biomass comes thoroughly treated and shredded and be entered whole into the biomass production platform for conversion to electricity.

Permeate Refining has the ability to "cube" biomass to help increase the Btu output, but most cubed mass is sold outside the plant for improved revenue production.

1. **MSW** – Fiberight processes MSW into ethanol. This MSW contains paper and other mass which has no natural outlet for anaerobic digestion. This mass must be dried separately from the mass intended for anaerobic digestion. This separate drying requirement increases the drying requirements of the Fiberight model prior to the paper's inclusion in a biomass process destined for the land fill;
2. **Corn Stover** – DuPont's corn stover model requires that stover be used as the basis for conversion to biomass to produce electricity to help operate the plant. Once ethanol is extracted from the stover, the stover must be thoroughly dried and cubed prior to its introduction into the biomass operation for conversion to electricity. This drying and cubing process requires additional energy.

OVERALL PROCESSING ANALYSIS

From the Overall additive processing, transportation and drying chart shown in Figure 1.5 above, the energy costs for processing Permeate Refining waste sugars and cellulose into ethanol is half that of Fiberight's and DuPont's. Fiberight's and DuPont's models are more complex requiring additional energy inputs.

BTUS IN STILLAGE BYPRODUCTS

All three models have a distinct method of treating and/or adding value to their back-end stillage treatment systems. Each method carries specific energy requirements and implications.

1. **Permeate Refining**: Permeate Refining has two major uses for its stillage:
   a. Binding Agent for cubing cellulose prior to biogas conversation for production of electricity;
   b. Animal feed
2. **Fiberight**: Fiberight's stillage is sent to the landfill and/or anaerobic digester depending on the composition of the stillage;
3. **DuPont**: DuPont's stillage is converted into biogas for the purpose of conversion for production of electricity.

Permeate Refining introduces a mixture of pure cellulose into this stage of their energy production platform. Permeate made attempts at gasifying single feedstock for the purpose of electrical production and it did not work; thus, Permeate resorted to a sugar based waste model with multiple cellulosic feedstock introduced on the back-end. This latter model creates a more practical approach to biofuels and lowers overall GHG emissions.

Gasifying single feedstock was a recipe for failure at Permeate's biogas unit. Permeate made attempts at gasifying its stillage wholesale, however, the stillage produced acidic and carbonic effects within the gasification unit and attached equipment that caused unwanted slag build-up. Permeate Refining then switched to gasifying waste corn stover and seeds; but, stover provided negative side effects which were

1. Creating adverse chemical reactions within the gasification and combustion units through the production of unwanted chlorine which destroyed pipes and valves;
2. Creating excessive heat which caused small fires in the baghouses due to material which failed to fully combust;
3. Creating excessive slag build-up

When Permeate Refining switched to a "cake mix" of biomass these gasification problems were alleviated.

The following chart outlines the Btu value associated with animal feed and anaerobic digestion. DuPont offers no secondary source of its stillage other than gasification. Permeate and Fiberight, on the other hand, offers several secondary sources for their stillage.

Stillage to Animal Feed & Anaerboic Digestion						
			Assumptions			
Permeate Capacity MGPY	4,000,000	Net Btus Per Pound Fluidized Bed	1200	Btus Per Gallon Needed for Animal Feed Replacement, Permeate	Percentage of Stillage Converted to Feed or Energy Bi-Product, Permeate	100%
Fiberight Capacity MGPY	5,000,000	Steam Re-Use Btus per Pound Fluidized Bed	720	Btus per Gallon Needed for Energy Replacement, Fiberight	Percentage of Stillage Converted to Feed or Energy Bi-Product, Fiberight	30%
DuPont Capacity MGPY	20,000,000			Btus per Gallon Needed for Energy Replacement, DuPont	Percentage of Stillage Converted to Feed or Energy Bi-Product, DuPont	0%
		Pounds of Stillage After Conversion to Fuel	**Btu Content of Residual**	**Converted to By-Product**	**Avoided or Additive Btus for Bi-Product**	***Btus Per Gallon of Ethanol Devoted to Animal Feed***
Permeate Refining	Food, Starch and Cellulose Waste	11	90,700	Animal Feed	90,700	***90,700.32***
Fiberight	Food, Starch, Cellulose, and MSW waste	23	155,894	Anaerobic Digestion	46,768	***46,768.20***
DuPont	Corn Stover and Corn residual	17	120,870	None	0	-

Permeate's animal feed Btu count approximates 90,700 Btus per gallon of ethanol, representing 8,232 Btus per pound of dry stillage. Lab tests from several testing offices demonstrated that Permeate's Btus, on average were 8,232 per dry pound. Since Permeate converts all its stillage to animal feed and/or a binder for biomass conversion to electricity, 100% of the Btu value is realized. The entire figure is utilized also because, in order to produce that much stillage, that much more corn needs to be planted to arrive at the quantity of animal feed as produced. is arrived at relative to the amount of corn that would need to be grown and the energy expended during that growing, harvesting, and production phase to achieve the same nutrient value found in Permeate's animal feed.

Additionally, Permeate applies a "steam re-use" model for the production of animal feed. That is, no additional energy is expended to create the animal feed, therefore, no energy is subtracted from the final 90,700 Btu value. The steam that is used during the ethanol production process is transferred to the animal feed plant, under separate management, and used to dewater and evaporate the stillage to make the feed palatable for the cattle at 60% water content. The 40% solids, 60% water are then shipped to local and national farmers as a supplement to their regular feed.

Although Fiberight has a higher Btu value for their stillage, the anaerobic digestion portion is less. Only thirty (30%) percent of its stillage is sent to the digester for production of methane. The remainder of the stillage waste is land applied.

DuPont sends no stillage to animal feed or anaerobic digestion.

BTUS IN STILLAGE BIOGAS

Permeate Refining, Fiberight and DuPont all have varying degrees of biogas creation. Fiberight's biogas is realized through anaerobic digestion while Permeate's and DuPont's are realized through converting stillage and cellulose into electricity which serves to power the plants.

The following Btu production charts helps layout those differences.

Stillage to Biomass, and/or Biomass Additive					
Assumptions					
Permeate Capacity MGPY	4,000,000	Tons of Permeate Biomass Processed Per Annum	22,000	Net Btus Per Pound DuPont	2,100
Fiberight Capacity MGPY	5,000,000	Tons of Biomass Processed Per Annum at 4 MWH	45,000	Total Leftover Biomass Permeate	67,000
DuPont Capacity MGPY	20,000,000	Tons of Dry MSW Processed Per Annum	75,000	Left Over Biomass Fiberight	57,500
Net Btus Per Pound Permeate	2,100	Tons of Corn Stover Biomass Process per Annum	300,000	Leff Over Biomass DuPont	230,000
		Total Biomass Remaining Per Size of Plant	**Total MMBtus Expended for Drying**	**MMBtus Reallized from Electric Conversion**	***Btus Per Gallon of Fuel***
Permeate Refining	**Food, Starch and Cellulose Waste**	67,000	-	2,814,000,000	***70,350***
Fiberight	**Food, Starch, Cellulose, and MSW waste**	0	0	0	-
DuPont	**Corn Stover and Corn residual**	230,000	(448,600,000)	9,211,400,000	***46,057***

Figure 1.6 Conversion of Stillage and Cellulose into Biomass for Electricity

At the biogas production stage Permeate Refining introduces a mixture of cellulose into plant in order to achieve optimal Btu output for conversion to electricity. The various cellulosic materials that Permeate Refining introduces into the biogas equation include, but are not limited to the following;

1. Corn stover and corn waste;
2. Waste seed corn;
3. Waste wood biomass and sawdust;
4. Waste paper;
5. Waste railroad ties;
6. Waste cardboard

The stillage from the ethanol production process is combined with the above materials which are then compressed or "cubed" to be sent through a biogas unit. The biogas unit produces synthetic gas which is then converted into electricity. The biogas unit is a 10 MWH unit which is currently capable of producing the same.

The equivalent of 70,350 Btus is realized for each representative gallon of ethanol that is produced. The higher value of Btus is due to the fact that Permeate introduces additional cellulose, other than stillage, into the biomass equation in order to achieve the highest biomass production possible.

The actual output of the biomass approximates 268,000 Btus per gallon. However, this chart is using a net Btu value, that is, 2100 Btus per pound of biomass. The average, tested gross Btu value of the biomass approximates 8,000 per pound. The particular fluidized bed gasification unit which Permeate Refining utilizes realizes a flow through efficiency rate of 26% which is standard for fluidized bed gasification plants. An additive steam turbine increases the efficiency another 50%, however this is not being reported here, if it were added, the efficiency output per realized would exceed 110,000 Btus per equivalent gallon.

DuPont processes significantly more biomass for conversion to electricity than does Permeate. DuPont's model is a single source feedstock, corn stover. Corn stover, as a single source feedstock for a gasifier would technically yield a lower Btu output per pound of biomass gasified. DuPont has not made public the specifics on the biomass unit it has designed for gasification other than to say it is a "fluidized bed" model similar to Permeate's.

Even though DuPont processes more biomass overall for conversion, per gallon of ethanol, Permeate processes twice as much biomass per gallon of ethanol for conversion to electricity than does DuPont. Permeate introduces additional cellulose into the fuel production scheme where DuPont is confined, within its model, to the biomass "within 30 miles of their plant" which would limit the biomass intake and production to mainly dried corn stover from their ethanol production process.

Whereas Permeate receives all dry biomass, DuPont must expend energy pulling the water from the converted stover, drying the remainder, and converting this dried remainder into synthetic gas, and then into electricity.

Even though Permeate maintains that converting a single source feedstock into biomass for the purpose of electrical production is impractical and will lower the over Btu output per pound of biomass converted (and create unwanted chlorine build-up[10]), Figure 1.6 awards DuPont the same 2,100 net Btus per pound of biomass converted DuPont's model using on the stover yielding 46,057 Btus per pound of equivalent ethanol gallon produced per biomass converted.

[10] http://www.omafra.gov.on.ca/english/engineer/facts/11-033.htm

Fiberight has no current means of converting biomass into electricity and thereby realizes no energy production benefit.

OVERALL BTU GAINS CONCLUSION

Figure 1.7 below outlines the overall Btu gains realized cumulative from the charts shown above.

		Btus Per Gallon of Ethanol	Btus Saved from Avoidance and Landfill Represented per Gallon of Ethanol	Btus for Animal Feed & Energy Bi-Products Represented per Gallon of Ethanol	Btus for Biomass Represented per Gallon of Ethnaol	Total GHG Based Btus Per Gallon	Btu Cost for Conversion to Ethanol & Animal Feed	Btu Cost for Conversion to Biomass into Electricity	Total Expended Btus for Conversion	Total Net Gain Btus per Gallon of Ethanol
Permeate Refining	Food, Starch and Cellulose Waste	76,500	95,927	90,700	70,350	333,478	(22,818)	(7,035)	(29,853)	303,625
Fiberight	Food, Starch, Cellulose, and MSW	76,500	34,768	46,768	-	158,036	(40,508)	0	(40,508)	117,529
DuPont	Corn Stover and Corn residual	76,500	52,912	0	46,057	175,469	(41,952)	(4,606)	(46,558)	128,911

Figure 1.7 Overall Btu Gains

As shown above, Permeate Refining's model of decreased cellulose at the ethanol stage and heightened cellulose at the biogas stage delivers an improved overall GHG emissions standard, or a reduction in overall GHG emissions (the more Btus, the less corn we need to plant in order to achieve GHG emissions parity).

Permeate's overall Btu count is twice that of Fiberight and/or DuPont's. Below is a review of those numbers:

1. **Ethanol**: Ethanol contains 76,500 Btus per gallon

2. **Avoidance**: 95,927 Btus. Each time a pound of sugar or food waste is sent to the landfill two Btu replacement events occur: (1) the sugar combines with natural bacteria in the soil and, with a half-life emissions rate of two years, produces an equivalent of 123,299 Btus of methane production, and (2) replacing the sugar that is wasted creates an additional need of 68,556 Btus for tilling, planting, growing, harvesting and processing corn to create the "missing" gallon of ethanol. Taken together, the two events create a negative 191,855 Btus per gallon of ethanol. Taken as an average, the Btu count for land filling sugar waste as opposed to converting into a fuel is 95,927.
3. **Animal Feed**: By creating animal feed from the stillage we are saving a total of 90,700 Btus per equivalent gallon of ethanol. In other words, each gallon of ethanol creates 90,700 Btus of stillage which is equivalent to growing that much more corn or grain to replace it.
4. **Biomass Conversion**: When Permeate Refining takes in additional biomass for conversion to electricity it creates a positive 70,350 Btus per equivalent gallon of ethanol.
5. **Cost of Production**: The energy cost for producing a gallon of ethanol from waste equals 29,855 Btus per gallon.
6. **Taken Together**: The positive Btu value of converting 18 pounds of waste into one gallon of ethanol, and an equivalent cellulose into electricity, is 303,625 Btus per gallon of ethanol. This 303,625 Btus per gallon of ethanol is greater than a cellulose only, or food waste/MSW model.

Another difference is that Permeate's model is not theoretical as conversion from waste and cellulose is being done on a daily basis. DuPont is currently in construction phase of their operation and Fiberight has yet to begin construction

From a GHG emissions perspective, converting sugar waste which contains cellulose into one gallon of ethanol, and converting biomass into electricity to supplement the energy needs of the production process, yields a significantly higher positive Btu output than the other two proposed models.

Permeate Refining, LLC owns and operates the following facilities:

1. A 5 MGPY Advanced Biofuel Cellulosic ethanol (AdBE) plant in Hopkinton, Iowa (Permeate Refining, LLC) processing paper, Algae, and other cellulosic fuels into fuel and electricity;

2. A 10 MWH fluidized bed biomass and fuel cell based biogas power plant;

3. Algae production farm and platform.

Since 1989 the ethanol plant has been converting various cellulosic based agricultural waste and cellulose masses bound for the landfill into ethanol, and, more recently, converting its stillage, or stillage waste, from this ethanol conversion process, into animal feed and a binder for cubed biomass for conversion to electricity.

The ethanol plant converts up 100 million pounds of carbohydrate and cellulosic based waste into five (5) million gallons per annum (MGPY).

Since 1998 the biogas plant has been converting various cellulosic waste feedstock into synthetic gas which is then fired to operate a steam turbine creating electricity. The biogas plant's feedstock consists of ethanol process stillage, waste paper, seeds, Municipal Solid Waste (MSW), grass trimmings, tree trimmings, construction waste, manufacturing waste, and other paper based waste. The biogas plant can convert up to100 million pounds of cellulosic waste per annum into synthetic gas, which is then converted into 63,000 MWHs per annum. The electricity is then sold to third party vendors or wheeled as a electricity substitute for producing ethanol.

The biogas facility can completely consume wood and other carbon based products which have been contaminated or laced with harmful chemicals turning these contaminated products into usable electricity. The harmful chemicals that remain, which are not completely reformulated due to excessive heat, are embedded into ash and subsequently used to mix with cement and/or road construction. Outside our destruction and electricity creation facility, various other disposal methods of contaminated wood and carbon based products are used which are costly creating substantial greenhouse gas emissions.

The following model helps illustrate the closed loop processing basis upon which Permeate, LLC operates:

The above model demonstrates the following processing flowchart:

1. Manufacturing companies process sugar, starch, food, and cellulose, creating waste during their manufacturing process. And/or sugar, starch, food or cellulose products become "outdated" and are declared waste bound for a landfill;
2. Permeate Refining intercepts or contracts to receive this waste being shipped from multiple manufacturing locations;
3. Once received, the waste is prepared for input into fermentation tanks;
4. Ethanol is extracted and sold;
5. The stillage is de-watered (not dried) and is converted into animal feed;
6. Excess water is sent back to the ethanol plant for reuse;
7. Cellulose is combined with a portion of the stillage and "cubed";
8. Additional cellulose is introduced at the biogas plant for shredding and combining into an optimum cake mix of biomass;
9. The optimum cake mix is then cubed and sent to a "biogas" unit where it is converted into synthetic gas for the production of electricity;
10. The electricity is returned to the grid for maximum sharing and/or ethanol production.

COMBINATION OF SUGAR AND CELLULOSIC WASTE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR -7 2014

OFFICE OF
AIR AND RADIATION

Mr. Darrell Smith
Permeate Refining
205 SE Locust Street
Hopkinton, Iowa 52237

Dear Mr. Smith:

Thank you for your interest in the Renewable Fuel Standard (RFS) program. We have reviewed your petition submitted pursuant to 40 CFR 80.1416 requesting evaluation of new renewable fuel pathways. In this petition, you requested EPA's assessment of the lifecycle greenhouse gas (GHG) emissions associated with Permeate Refining's proposal to produce ethanol from various factory byproduct materials including sugars, starches and syrups derived from corn, rice, wheat, and sugar beets, among other agricultural crops.

On the basis of the information supplied in your petition documentation, this fuel pathway is similar to the approved advanced biofuel pathway in row P of Table 1 to § 80.1426 for ethanol produced from the non-cellulosic portions of separated food waste. Because this pathway already appears in the RFS regulations, the EPA has determined additional lifecycle GHG assessment is unnecessary at this time. Therefore, you may proceed with the RFS registration process.[1] Please note, however, that to be eligible to generate advanced biofuel (D-code 5) RINs using the ethanol pathway provided in row P of Table 1 to § 80.1426 you will need to demonstrate that your ethanol is produced from feedstocks that meet the definition of separated food waste provided at § 80.1426(f)(5) in the RFS regulations, and complies with all other applicable regulatory conditions.

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Sincerely,

Karl Simon, Director
Transportation and Climate Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR -7 2014

OFFICE OF
AIR AND RADIATION

Mr. Darrell Smith
Permeate Refining
205 SE Locust Street
Hopkinton, Iowa 52237

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Transportation and Climate Division

To: Levy, Aaron[Levy.Aaron@epa.gov]
From: Darrell D. Smith
Sent: Fri 2/14/2014 11:47:02 PM
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Mr. Levy

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I will have it to you next week.

Darrell

From: Levy, Aaron [mailto:Levy.Aaron@epa.gov]
Sent: Friday, February 14, 2014 3:21 PM
To: corpgold@netconx.net
Subject: [EMTS Support #48315] Permeate Petition Status

Hello Darrell,

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I will be on work travel next week. The best way to reach me during that time will be email, but I may not be able to respond until the week of the 24th.

I look forward to hearing from you and working with you on your petition.

Sincerely,

Aaron Levy

Transportation and Climate Division (TCD)

Office of Transportation and Air Quality (OTAQ)

U.S. Environmental Protection Agency (EPA)

levy.aaron@epa.gov, 734-214-4586

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR -7 2014

OFFICE OF
AIR AND RADIATION

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205 SE Locust Street
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To: Darrell D. Smith[corpgold@netconx.net]
From: Levy, Aaron
Sent: Tue 2/18/2014 4:24:31 PM
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Hi Darrell,

Thanks for this helpful update. Before you submit a revised petition I think it might be helpful to have a short call (30 min.) to narrow in on what key information is needed by EPA to review your request as expeditiously as possible.

I will be on work travel the rest of this week, but next week works for my schedule, especially Wednesday or Thursday between 10am-5pm eastern. Are there some times that work for you?

Regards,

-Aaron

From: Darrell D. Smith [mailto:corpgold@netconx.net]
Sent: Friday, February 14, 2014 6:47 PM
To: Levy, Aaron
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Mr. Levy

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levy.aaron@epa.gov, 734-214-4586

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From: Levy, Aaron
Sent: Fri 2/14/2014 9:20:47 PM
Subject: [EMTS Support #48315] Permeate Petition Status

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APR -7 2014

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Karl Simon, Director
Transportation and Climate Division

To: Darrell D. Smith[corpgold@netconx.net]
From: Levy, Aaron
Sent: Wed 4/16/2014 1:10:47 PM
Subject: FW: [EMTS Support #48315] Permeate Petition Status

Resending.

From: Levy, Aaron
Sent: Friday, April 11, 2014 3:02 PM
To: 'Darrell D. Smith'
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Hi Darrell,

Good talking with you today. As we discussed, I am providing links to information about the petition process for new fuel pathways under the Renewable Fuel Standard (RFS) program.

Overview and guidance on the petition process:
http://www.epa.gov/otaq/fuels/renewablefuels/rfs2-lca-pathways.htm

Approved renewable fuel pathways and applicable RIN D-codes:
http://www.epa.gov/otaq/fuels/renewablefuels/new-pathways/rfs2-pathways-determinations.htm

Please address questions about compliance and registration, such as which feedstocks qualify as renewable biomass per the RFS regulatory definition, to our support line at support@epamts-support.com.

Sincerely,

-Aaron

From: Darrell D. Smith [mailto:corpgold@netconx.net]
Sent: Friday, April 11, 2014 9:31 AM
To: Levy, Aaron

Subject: RE: [EMTS Support #48315] Permeate Petition Status

Mr. Levy

I have had zero time working 20 hour days trying to get certain things done for a transition

I will call you today; we have not submitted a full petition update – I submitted s summary but will get with the scientist who wrote most of that and give you a call

I understand this is an important issue for us. I am sorry for not calling earlier – I just have had no time – I will call you next week.

Darrell

515-422-3403

From: Levy, Aaron [mailto:Levy.Aaron@epa.gov]
Sent: Tuesday, April 08, 2014 1:20 PM
To: Darrell D. Smith
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Hello Mr. Smith,

Attached is a signed response to the petition you submitted in February 2012. A paper copy was also sent via first-class mail today. Please let me know if you have any questions.

Sincerely,

Aaron Levy

Transportation and Climate Division (TCD)

Office of Transportation and Air Quality (OTAQ)

U.S. Environmental Protection Agency (EPA)

levy.aaron@epa.gov, 734-214-4586

From: Levy, Aaron
Sent: Monday, March 10, 2014 2:54 PM
To: Darrell D. Smith
Cc: 'Dennis Roland'
Subject: RE: [EMTS Support #48315] Permeate Petition Status

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515-422-3403

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Sent: Tuesday, February 18, 2014 10:25 AM
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To: Darrell D. Smith[corpgold@netconx.net]
From: Levy, Aaron
Sent: Wed 4/16/2014 1:09:55 PM
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Dear Mr. Smith,

I'm sorry you didn't receive the email I sent last Friday (4/11). I will resend that email shortly.

Thank you for email asking about the eligibility of ethanol produced from the non-cellulosic portions of separated food waste (row P in Table 1 to 40 CFR 80.1426). I am referring your questions to the appropriate staff in our Compliance Division, using the ticket number in the subject line of this email (#48315).

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From: Darrell D. Smith [mailto:corpgold@netconx.net]
Sent: Tuesday, April 15, 2014 7:59 PM
To: Levy, Aaron
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Mr. Levy

I did not receive the email you were going to send

I know you can complete a lifecycle analysis. But, we could not find a completed lifecycle analysis relative to the landfilling waste starches and the GHG emissions effect of feeding waste starches to animals. If corn starch represents over 70% of the sweetener industry in the country, then it stands to reason that food waste that contains this sweetener is the predominate food waste in the country. The fibrous portion of food waste is not the primary culprit for food waste based GHG emissions – it is the starches and sugars contained within the food waste. It is the starches are sugars within food waste that convert to ethanol or methane gas. Both the USDA and the EPA permits that electricity produced from anaerobic digestion can be counted as "advanced" and qualified for federal KWH tax credit production purposes. However, the <u>vast majority</u> of sugars contained with the anaerobic digestion process, which represent 80% of the interactive methane output, are derived from corn and corn starch sweeteners.

So, we can say that energy produced from anaerobic digestion, where separated corn starch is primary sweetener within that feedstock, qualifies as an "advanced biofuel". But, we cannot say that energy produced from the same material converted into ethanol also qualifies as advanced? It can easily be shown that per pound of converted starch, ethanol produced from food waste <u>yields a higher net Btu value</u> than does electricity produced from anaerobic digestion.

If sweeteners derived from corn are excluded from food waste, then you are excluding over 70% of the food waste from advanced bioufel production. If you are excluding 70% of the food waste from advanced biofuel production, and not only that, but, as Hatfield points out, excluding the most GHG egregious portions of the food waste cycle, then what is the point of including food waste at all? It is a practical impossibility to separate corn sweetened food waste from non-corn sweetened food waste.

We can name food waste by many things – separated, fibrous, cellulosic, etc., but, it is the starches and sugars present in the food waste that creates the most egregious negative form of GHG emissions – especially true when landfilled or fed to animals. <u>*We have a different solution*</u> – combine cellulose and food waste into a single energy production model to arrive at an overall net decrease in GHG emissions.

If the goal is to decrease GHG emissions, then we were asking that you consider the food waste sweetened by the corn starch market, which comprises 70% of all food waste, as being eligible, or included, within the category of eligible convertible feedstock for advanced biofuel production. Congress did not intend for corn sweetener waste to be excluded from qualified food waste"- I spoke to at least one person who helped craft that legislation (RFS2). He states it is how the EPA interprets Congressional intent that makes a difference, not what Congress actually intended by singling out ethanol derived from corn. Separated starch has no nutrients for ethanol production. Nutrients must be re-introduced into the separated starch equation in order for separated starch to convert into fuel. This additive process is difficult and costly.

Most waste starches are derived from corn. Waste starches represent the most egregious GHG emitter in animal digestion – it is the undigested starches which are the principle contributor to belching in cows and added methane release in the discharge of manure. We are converting these starches into fuel before they become a problem to the environment.

We enlisted one of the nation's foremost greenhouse specialists to tell us if the proposed GHG emissions lifecycle was honest. He concluded that not only does our model decrease overall GHG emissions, but it betters a purely cellulosic model by 2 X relative to reducing GHG emissions per pound of feedstock converted.

The EPA is concerned about food waste. Multiple publications and theses have been written regarding the negative effects of dumping processed food into landfills and waste streams.

We combine the production of food waste and cellulose into a single energy production model. There is no petition I see that does exactly what we are doing. The EPA's studies reveal that MSW, in general, has a lower GHG emissions footprint than food waste given the quick release of methane from food waste, when soil interactive.

We asked a simple question.

Please advise

Darrell Smith

From: Levy, Aaron [mailto:Levy.Aaron@epa.gov]
Sent: Tuesday, April 08, 2014 1:20 PM
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Hi Darrell,

Good talking with you today. As we discussed, I am providing links to information about the petition process for new fuel pathways under the Renewable Fuel Standard (RFS) program.

Overview and guidance on the petition process:
http://www.epa.gov/otaq/fuels/renewablefuels/rfs2-lca-pathways.htm

Approved renewable fuel pathways and applicable RIN D-codes:
http://www.epa.gov/otaq/fuels/renewablefuels/new-pathways/rfs2-pathways-determinations.htm

Please address questions about compliance and registration, such as which feedstocks qualify as renewable biomass per the RFS regulatory definition, to our support line at support@epamts-support.com.

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From: Darrell D. Smith [mailto:corpgold@netconx.net]
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I have had zero time working 20 hour days trying to get certain things done for a transition

I will call you today; we have not submitted a full petition update – I submitted s summary but will get with the scientist who wrote most of that and give you a call

I understand this is an important issue for us. I am sorry for not calling earlier – I just have had no time – I will call you next week.

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OAR-14-000-7341_signed response.pdf

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Subject: [EMTS Support #48315] Permeate Petition Status

Hello Darrell,

I am writing about the petition from Permeate Refining dated May 17, 2012 for a new Renewable Fuel Standard (RFS) fuel pathway. I believe it's been a while since we checked in with you regarding the status of your request. We have been making progress addressing some of the questions in your application. I would be happy to discuss this with you at some point, but as a first step I wanted to check in regarding Permeate's status. Has anything changed with regard to your petition request?

I will be on work travel next week. The best way to reach me during that time will be email, but I may not be able to respond until the week of the 24th.

I look forward to hearing from you and working with you on your petition.

Sincerely,

Aaron Levy

Transportation and Climate Division (TCD)

Office of Transportation and Air Quality (OTAQ)

U.S. Environmental Protection Agency (EPA)

levy.aaron@epa.gov, 734-214-4586

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR -7 2014

OFFICE OF
AIR AND RADIATION

Mr. Darrell Smith
Permeate Refining
205 SE Locust Street
Hopkinton, Iowa 52237

Dear Mr. Smith:

Thank you for your interest in the Renewable Fuel Standard (RFS) program. We have reviewed your petition submitted pursuant to 40 CFR 80.1416 requesting evaluation of new renewable fuel pathways. In this petition, you requested EPA's assessment of the lifecycle greenhouse gas (GHG) emissions associated with Permeate Refining's proposal to produce ethanol from various factory byproduct materials including sugars, starches and syrups derived from corn, rice, wheat, and sugar beets, among other agricultural crops.

On the basis of the information supplied in your petition documentation, this fuel pathway is similar to the approved advanced biofuel pathway in row P of Table 1 to § 80.1426 for ethanol produced from the non-cellulosic portions of separated food waste. Because this pathway already appears in the RFS regulations, the EPA has determined additional lifecycle GHG assessment is unnecessary at this time. Therefore, you may proceed with the RFS registration process.[1] Please note, however, that to be eligible to generate advanced biofuel (D-code 5) RINs using the ethanol pathway provided in row P of Table 1 to § 80.1426 you will need to demonstrate that your ethanol is produced from feedstocks that meet the definition of separated food waste provided at § 80.1426(f)(5) in the RFS regulations, and complies with all other applicable regulatory conditions.

Your petition argued that EPA's regulatory definition of separated food waste should be interpreted to include separated industrial waste (for example a biogenic waste stream from a factory that uses starches to produce biodegradable plastics), such that ethanol produced from separated industrial waste would be eligible to generate advanced biofuel (D-code 5) RINs. In the March 2010 RFS final rule (75 FR 14670) EPA interpreted the definition of advanced biofuel in CAA Section 211(o) to include ethanol derived from separated food waste, which the Agency defined at § 80.1426(f)(5) to be "...a feedstock stream...which includes food and beverage production waste and post-consumer food and beverage waste..." In the March 2010 RFS final rule EPA discussed what is included in the definition of separated food waste. For example the Agency observed that "the statute itself identifies 'recycled cooking and trap grease' as one example of separated food waste" (75 FR 14704). However, after considering the statutory language, EPA did not include "separated industrial waste" nor mention feedstock streams derived from industrial processes in the definition of seperated food waste. For these reasons we do not believe it would be appropriate to interpret the RFS regulatory definition of separated food waste to

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To the extent that you can demonstrate, using the RFS registration and reporting provisions provided at §§ 80.1450 and 80.1451, that yo edstocks that meet the regulatory definition of separated four ethane l is produced from fe s specified at § 80.1426, such ethanol may be eligible to generate advanced bi qualifying pathways Ns. If you have any additional questions on the petition or registration processes, please contact our support line by emailing support@epamts-support.com and include "Permeate Refining" as the subject line.

Sincerely,

Karl Simon, Director
Transportation and Climate Division

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Sincerely,

Karl Simon, Director
Transportation and Climate Division

To: Darrell D. Smith[corpgold@netconx.net]
Cc: 'Dennis Roland'[droland50@ymail.com]
From: Levy, Aaron
Sent: Mon 3/10/2014 6:53:53 PM
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Hi Darrell,

Are you available for a phone conversation this week or next? I would like to understand how this new report about cellulosic biofuel fits with the longer report that we received in 2012 regarding ethanol produced from the non-cellulosic portions of separated food and industrial waste.

Some times that currently work for my schedule (all times eastern):

- Wednesday (3/12), 2pm
- Tuesday (3/18), 4pm

Thanks,

-Aaron

From: Darrell D. Smith [mailto:corpgold@netconx.net]
Sent: Monday, March 10, 2014 11:49 AM
To: Levy, Aaron
Cc: 'Dennis Roland'
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Mr. Levy

Attached is the report written last year.

Dr. Hatfield earned a Nobel prize. Part of his work has centered on GHG emissions.

I am updating the report this week with the inputs of a chemical engineer. A chemical engineer is going through the plant and adding scientific notations.

We will put an index on it.

Darrell Smith

515-422-3403

From: Levy, Aaron [mailto:Levy.Aaron@epa.gov]
Sent: Tuesday, February 18, 2014 10:25 AM
To: Darrell D. Smith
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Hi Darrell,

Thanks for this helpful update. Before you submit a revised petition I think it might be helpful to have a short call (30 min.) to narrow in on what key information is needed by EPA to review your request as expeditiously as possible.

I will be on work travel the rest of this week, but next week works for my schedule, especially Wednesday or Thursday between 10am-5pm eastern. Are there some times that work for you?

Regards,

-Aaron

From: Darrell D. Smith [mailto:corpgold@netconx.net]
Sent: Friday, February 14, 2014 6:47 PM
To: Levy, Aaron
Subject: RE: [EMTS Support #48315] Permeate Petition Status

Mr. Levy

I have updated our petition – it is written and edited

It is being finalized by a U.S. Government greenhouse specialist.

I could email it as it is – but, it includes information which only this official can finalize – he has already validated our findings – I am told he has a Nobel Prize based on a study defining weather patterns as these patterns relate, they believe, to excess GHG emissions.

In the past the EPA's feedstock petition approvals have appeared to focus feedstock was "predominately cellulose". This official refocused our application on GHG emissions, specifically pounds of carbon and methane emitted or avoided per pound of waste and cellulose, relative his reading of section 211(o) of the Clean Air Act.

A plain, layman, reading of Section 211(o) of the Clean Air Act implies a feedstock is judged relative to measurements which avoid GHG emissions, not just the predominance of cellulose present in the feedstock. Yet, the section also classifies cellulose, in and of itself, as the feedstock which must best exemplify the avoidance of GHG emissions. I realize that your approval program takes a close look at all feedstock, including cellulose, prior to approval – but, your approval process is a practical application of this section of the Clean Air Act. It seems to us that your practical application of feedstock approval based on the principal of "predominately cellulose", can create conflicts with a plain reading of the section because not all cellulose is good, or best, relative to avoiding GHG emissions.

I say this because our real world gasification and fuel conversion experience of certain cellulose feedstock differs from an underlying presumption that "all cellulose is good" relative to GHG emissions. For example, when the stillage from corn stover, and/or waste seed corn (fungus coated intended for planting only), is converted to synthetic gas, it has an above average concentration of chlorine. Chlorine, when naturally mixed with traces of moisture present in the stover and seed, creates HCL or muriatic acid (hydrochloric acid). This acid destroys the metals in the pipes in our gasification plant. This HCL cost us $100,000s of thousands in losses and pipe replacements. I am told they can build a scrubber to scrub out much of the chlorine prior to its substitution for natural gas, but, this scrubbing process decreases the heat value of the gas which translates into lower gas output. So, practically speaking, in order to continue to use the stillage from waste corn stover and seed corn, we had to combine it with other cellulose, mainly waste wood and paper. We could only use a combination of 10% stover and seed corn, with 90% wood and paper in order to (1) avoid the creation muriatic acid, (2) avoid combining synthetic gas with natural gas, and (3) produce a quality synthetic gas for steam production and conversion to electricity.

Thank you for writing me – I should have had it to you months ago – it was completed – but, wanted to make sure the science was accurate.

I will have it to you next week.

Darrell

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Sent: Friday, February 14, 2014 3:21 PM
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U.S. Environmental Protection Agency (EPA)

levy.aaron@epa.gov, 734-214-4586

From: Levy, Aaron
Location: 6524; call-in 1.866.299.3188 c/c: 202.784.7465
Importance: Normal
Subject: Accepted: New Request from Permeate (waste as feedstock)
Start Date/Time: Thur 3/14/2013 8:30:00 PM
End Date/Time: Thur 3/14/2013 9:00:00 PM

From: Levy, Aaron
Location: 6524
Importance: Normal
Subject: Accepted: New Request from Permeate (waste as feedstock)
Start Date/Time: Thur 3/14/2013 7:00:00 PM
End Date/Time: Thur 3/14/2013 7:30:00 PM

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